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IN CHINA

- USSR -

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CHEMICAL MACHINE BUILDING ON THE RISE IN CHINA

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Although our country possesses a vast territory, a large population, abundant resources, a centuries-old history, and a high level of culture, under the rule of the reactionary Kuomintang clique the old China was extremely backward economically and had very few enterprises in its chemical industry. There was no chemical machine building as such, and small distilling apparatus, evaporators, low-speed centrifuges, heat exchangers for the oil-processing industry, and mobile low-power compressors were only occasionally manufactured. Various items of equipment, including compressors, high pressure apparatus, and oxygen installations, were all imported from abroad.

During the period of the Chinese people's war of liberation, and especially on the eve of the country's liberation, the Kuomintang reactionaries together with the foreign imperialists, almost completely destroyed the chemical industry and chemical equipment repair shops.

The great Chinese People's Republic was founded in 1949, after the country's liberation. Under the wise leadership of the Chinese Communist Party and the great leader of the Chinese people, Chairman Mao Tse-tung, our people achieved considerable increases in the total output of light and heavy industry. This was accomplished during the three-year period of the restoration of the economy, in the course of the First Five-Year Plan, and especially after the great leap forward in 1958. Thus, the total output of heavy and light industry by far exceeded the highest production level prior to the country's liberation. Together with the great achievements in the chemical industry, chemical machine building also developed at a great rate of speed.

The rapid development of fertilizer production was initiated in 1955 to meet the needs of agriculture. In

1955, the Yunling Plant (Nanking) began the experimental production of high-pressure (320 atmos.) multilayer containers. This project was successfully completed with the assistance of the Scientific Research Institute of Chemical and General Machine Building of the Chinese People's Republic and other organizations; thus, in 1957, the first high-pressure multilayer container was delivered. Since 1958, the production of high-pressure multilayer containers has been mastered in Kharbin and in four other boiler factories.

On the basis of the study of the experiences of the Soviet Union and other fraternal socialist countries, our institute, together with other organizations, worked out the construction, production technology, and control of high-pressure multilayer containers.

Work was also widely undertaken on the production of high-pressure apparatus jackets; production was carried out by means of the auto-frettage method, in which the jackets are fitted on the rolling wire and welded from plate steel.

At present, further investigations connected with discovering the strengths and defects of high-pressure apparatus are being conducted in our country. At the same time, active preparations are being made for the experimental production of high-pressure (1,500 atm.) spun jackets and bodies. Work has already begun on the production of welded large-size, high-pressure apparatus. Compressor construction is expanding in the Chinese People's Republic. Low-pressure air compressors of low capacity were manufactured in 1949-1952. The production of low-pressure compressors and high-pressure compressors of low capacity began in 1953. In 1955, an experimental model of a high-pressure compressor of 2,000 hp, 6,000 m³/hour capacity for residual pressures of 200 kg/cm² was independently designed and manufactured by the Dairen Chemical Plant as the result of close collaboration among the engineering, technical, and shop personnel. This opened the first stage in the independent design and manufacture of high-power, high-pressure compressors in our country.

In 1958, during the period of the great leap forward in the industry and agriculture of our country, the production of large- and medium-size high-pressure compressors for the chemical and oil industry developed rapidly.

By the end of 1958, as many as 50 different sizes of piston compressors were being manufactured. At present, over 60 different sizes of compressors with a pressure range of from three to 362 kg/cm² and a capacity of from 0.2 to 266 m³/minutes are being manufactured. In addition, the production of rotating and centrifugal compressors, as

well as special gas compressors has also expanded. At present, research is being carried out in this field and experimental high-pressure compressors (1,500 atms.) are being manufactured.

In the sulfuric acid manufacturing plants of the Chinese People's Republic, work has been carried out for the purpose of increasing the efficiency of a mechanical pyrite-roasting furnaces; this has resulted in a more efficient use of the roasters and in a reduction of the cost of production. Experiments conducted with the fluidized bed roasting method in the Nanking Plant resulted in the replacement of the old mechanical furnaces by fluidized bed furnaces. These furnaces are now being used in many sulfuric acid production plants. In addition, research is being conducted on pyrite roasting in small-size turbulent burners.

Larger diaphragm baths for electrolysis were manufactured and introduced in accordance with the needs created by the development of the sodium hydroxide industry. In order to effect economies in the use of metal and electric current and to increase the efficiency of the installation for sodium-hydroxide evaporation, in 1958 research work based on the experience of the Soviet Union was begun on evaporating apparatus with an increased rate of circulation (designed by Levin and others). This apparatus is already in use in some factories of the sodium hydroxide industry.

Since the establishment of the new China, the machine building industry has developed branches for the production of refrigerating installations and installations for the separation of gases by the deep-freeze method.

During the First Five-Year Plan, we began the serial production of equipment for manufacturing technical gaseous oxygen and portable installations for the production of liquid oxygen.

In 1958, our country manufactured equipment for the simultaneous production of oxygen and nitrogen in metallurgical enterprises. Since then, our machine building industry has been supplying the metallurgical and synthetic ammonia plants with powerful domestic installations for the production of oxygen and nitrogen. Research was initiated last year in our country on the manufacture of equipment for the production of oxygen, nitrogen, argon, and various rare gases; the latter included krypton, xenon, neon, and helium. Successful research has been completed on the production of porous ceramic filters for the manufacture of neon and helium from a mixture of gases.

More than 30 types of compressor cooling machines

have been created. The largest of these machines are the one-step ammonia compressor with a cooling efficiency of 1,000,000 Cal/hour at an evaporation temperature of -15°C and the two-step ammonia compressor with a cooling efficiency of 400,000 Cal/hour at an evaporation temperature of -43°C . To a considerable extent, these cooling machines have met the needs of the different branches of the industry of our national economy.

Great progress has also been made in the production of equipment for the rubber-and plastics-processing industry, in keeping with the fast tempo of the economic development of our country. In 1955, powerful rollers and rubber mixers with a capacity of 135 liters were produced and put into operation. In 1958, a four-roller calender with a high level of calendering accuracy was successfully tested; this achievement contributed to the rapid development of the tire industry of the Chinese People's Republic.

In recent years, and especially since the great leap forward, the progress of experimental research has enabled our machine building industry to master the production of various types of equipment for natural and synthetic rubber processing, including machines for the preparation of rubber mixtures and vulcanization. Recently, this branch of industry has made progress toward the goal of mastering the production of the automatic vulcanizer-formator for tires, as well as rapid mixers, and other efficient machines.

Research work has been undertaken on worm machines for the processing of plastics with worms of 100 mm in diameter; these machines are now being produced on an experimental basis. Moreover, we have already begun the production of casting machines and presses for up to 250-ton pressures, as well as other new efficient machines for plastics processing.

Machines and apparatus for the separation of heterogeneous systems are in wide use in the chemical, food, and pharmaceutical industries.

The production of centrifuges in our country began in 1952. In 1954, we undertook the serial production of centrifuges with a pulsating discharge of precipitate for the fertilizer and pharmaceutical industries. At the same time, we undertook the production of plate separators with 4,500 revolutions per minute. Recently, we began a study of the function of continuous-motion high-speed centrifuges, in accordance with the needs of industry. Vacuum filters constitute important items of equipment in the sugar industry, the soda industry, and in other branches of industry. The vacuum filters produced in our country have

up to 40 m² of filtering surface. Plate vacuum filters and frame filter presses are being manufactured to satisfy the needs of the chemical industry, as well as other branches of industry.

Corrosion-resistant materials constitute a serious problem in chemical machine building. Various steel alloys and nonferrous metals are produced in our country. In addition, nonmetallic materials, including plastics, graphite, and others, are widely used in the manufacture of chemical apparatus.

Ceramics are also used in the manufacture of chemical equipment. At present, ceramics are used in the Chinese People's Republic for the manufacture of reaction vessels, air lifts, columns, heat exchangers, gas blowers, pumps, fittings, and other apparatus.

In addition, large-size apparatus, 1500-2000 mm in diameter, with a high level of heat resistance are being planned and designed for direct heating. This apparatus is suitable for operations under pressures of up to 8 kg/cm².

Under conditions of a continuous vigorous development of the national economy, work on standardization and normalization in the chemical machine building industry is proceeding very rapidly; this constitutes one of the important measures in the realization of the Party's general line: "Intensify all efforts, press forward, build socialism more rapidly, better, and more economically"; it also constitutes an important task in the realization of the technical revolution and in the implementation of technical innovations.

Taking into account the advanced experience of the Soviet Union and other fraternal socialist countries, as well as our country's actual material and technical capacities, we have worked out a standardized series of piston air compressors; moreover, these compressors have gone into production. Standards were worked out for shell and tube heat exchangers, which are widely used in the chemical and oil industry. In addition, work has been started on the design of standard machines for a standardized series of ammonia installations.

In addition, technical conditions have been worked out for the production of capacitive apparatus and technical conditions have been established for the adoption of high-pressure containers. The development and dissemination of norms and standards for the main parts of machines and junctions will promote a rapid rate of development in the chemical machine building industry in our country.

The above-mentioned results are only a part of our

achievements in the field of the chemical machine building industry. However, these results demonstrate that the chemical machine building industry of the Chinese People's Republic has developed successfully, progressing from the repairs of chemical equipment to the independent design and adoption of advanced modern engineering facilities.

Under the leadership of the Chinese Communist Party and the great leader of the Chinese people, Chairman Mao Tze-tung, great progress has been achieved in all the branches of the industry and agriculture of the Chinese People's Republic. These successes resulted from the Party's general line during the building of socialism, the disinterested help rendered by the Soviet Union and other fraternal socialist countries, and the self-sacrificing efforts of the people of our country.

During the last 10 years the chemical machine building industry, as well as all the other industries of our country, has developed very rapidly. The direct assistance which was and is being rendered by the All-Union Scientific Research and Construction Institute of Chemical Machine Building of the Soviet Union and by many Soviet experts has played a very important role in the development of the chemical machine building industry.

All workers and scientific and technical personnel of the Chinese chemical machine building industry are firmly moving forward along the bright path of building socialism in our country.

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